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"A New Species of Freshwater Crab from Western Kenya"

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A new species of freshwater crab of the genus *Potamonautes* MacLeay, 1838, (Brachyura: Potamoidea: Potamonautidae) from the forested highlands of western Kenya, East Africa

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Abstract.—A new species of freshwater crab, *Potamonautes subukia*, from the forested highlands of western Kenya, East Africa, is described. The small body size at maturity, smooth carapace, and slim outwardly directed first gonopod clearly distinguish this species from all other congeners.

Recent ecological studies of stream communities in the highlands of western Kenya by the second author (Dobson et al. 2007) revealed the existence of a new species of freshwater crab in the genus *Potamonautes* MacLeay, 1838, which is described herein. This genus belongs to the family Potamonautidae Bott, 1970, that includes genera from continental Africa, Madagascar, and the Seychelles (Cumberlidge et al. 2008, Yeo et al. 2008). The more than 65 species of *Potamonautes* so far described are distributed throughout sub-Saharan continental Africa, along with the Nile catchment in North Africa (Bott 1955, Stewart et al. 1995, 1997a, 1997b; Daniels et al. 1998, Stewart & Cook 1998, Cumberlidge 1999, Daniels et al. 2000, 2002; Corace et al. 2001, Gouws et al. 2001, Cumberlidge et al. 2002, Cumberlidge & Vannini 2004, Reed & Cumberlidge 2004, 2006; Cumberlidge & Tavares 2006). The new species is compared with other members of the genus and is distinguished by its small size at maturity and its possession of a unique combination of characters of the adult male (first gonopod, carapace, thoracic sternum, and chelipeds). Specimens are deposited in the museum of the Department of Biology, Northern Michigan University, Marquette, Michigan, U.S.A. (NMU), and in The Natural History Museum, London, UK (BMNH).

Abbreviations.—Terminology is adapted from Cumberlidge (1999), and the classification used here follows that of Cumberlidge et al. (2008) and Ng et al. (2008). Abbreviations: cw, distance across the carapace at the widest point; cl, carapace length measured along the median line, from the frontal margin to the posterior margin; ch, carapace height (the maximum height of the cephalothorax); fw, front width measured along the frontal margin; s, thoracic sternite; s4/s5, s5/s6, s6/s7, s7/s8, sternal sulci between adjacent thoracic sternites; e, thoracic episternite; s4/e4, s5/e5, s6/e6, s7/e7, episternal sulci between adjacent thoracic sternites and episternites; a, abdominal segment; p1–p5, pereiopods 1–5; asl, above sea level. All measurements are given in mm. SMNH, Swedish Museum of Natural History (Naturhistoriska riksmuseet), Stockholm, Sweden; MCZ, Museum of Comparative Zoology, Harvard University, MA, USA.

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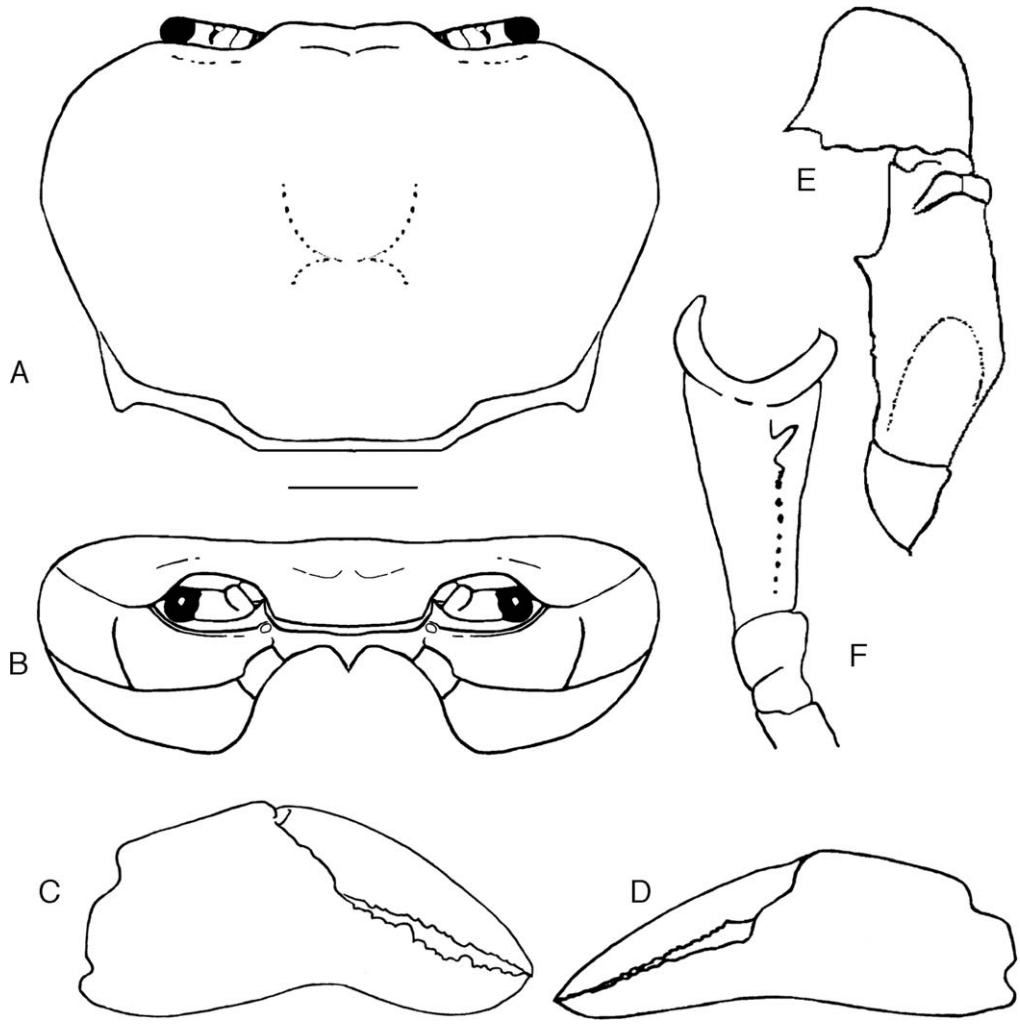

Fig. 1. *Potamonautes subukia*. Male holotype, cw 22.5 mm, from Subukia, western Kenya, NMU 18.X.2003. A, carapace, dorsal view; B, cephalothorax, frontal view; C, right cheliped, frontal view; D, left cheliped, frontal view; E, carpus and merus of right cheliped, dorsal view; F, carpus and merus of right cheliped, inferior view. Scale bar = 4.6 mm.

Superfamily Potamoidea Ortmann, 1896
Family Potamonautidae Bott, 1970
Potamonautes subukia, new species
Figs. 1, 2

Material examined.—Holotype: adult male (cw 24 mm) Kenya, Chinga River (0°00′15.8″N, 36°15′33.1″E; elevation 2180 m), a small tributary of the Subukia River, Rift Valley Province, hand caught approximately 1 km southeast (upstream) of Nakuru-Nyahururu road in forest, coll. M. Dobson, 18 Oct 2003 (NMU 18.10.2003). Paratypes: Adult male (cw 18 mm), adult female (cw 22 mm), Kakamega-Kaimosi area, western Kenya, with *P. loveni*, coll. J. McMahon, 12 Jul 1950 (BMNH 1950.12.7.21); Marun River at Kaibuibich, Sigor, Cherangani Mts. (1°34′0″N, 35°31′0″E), coll. T. R. Williams, 1962 (NMU EA62.147).

Diagnosis.—Carapace high (ch/fw 1.3), epigastric crests distinct, postorbital crests faint, not meeting epigastric crests or

anterolateral margins; ischium of third maxilliped with either smooth or faint vertical sulcus; thoracic sternal sulcus s3/s4 reduced to two short side notches; terminal article of gonopod 1 long, angled outward at 45° angle to longitudinal axis of gonopod; broadened in mid-section (medial fold slightly higher than lateral fold); distal margin of subterminal segment indented in middle, highest on medial side lowest on lateral side; dorsal membrane very broad, widest medially, narrowest laterally; basal margins of subterminal segment of gonopod 1 with long setae.

Description.—Based on holotype, adult male. Carapace oval (Fig. 1A), wide (cw/fw 3.2), medium height (ch/fw 1.3); surface completely smooth semi-circular, urogastric, transverse branchial grooves faint. Front straight, relatively narrow (Fig. 1B), about one-third carapace width (fw/cw 0.32), anterior margin sharply deflexed. Postfrontal crest faint, epigastric crests distinct, postorbital crests faint, not meeting epigastric crests or anterolateral margins. Anterolateral margin between exorbital, epibranchial teeth smooth, lacking intermediate tooth; exorbital, epibranchial teeth reduced to small granules, anterolateral margin completely smooth, continuous with posterolateral margin; suborbital margin raised, completely smooth. Carapace sidewall completely smooth, divided into three parts by longitudinal (epimeral) suture (dividing suborbital, subhepatic regions from pterygostomial region), and by vertical (pleural) groove (dividing suborbital from subhepatic regions). Second sulcus s2/s3 deep, running horizontally across sternum (Fig. 2B); third sulcus s3/s4 lacking, except for two faint notches on sides; episternal sulci s4/e4, s5/e5, s6/e6, s7/e7 absent. Third maxillipeds (Fig. 2A) filling entire oral field, except for transversely oval respiratory openings at superior lateral corners; long flagellum on exopod of third maxilliped, ischium of third maxilliped either smooth or with very faint vertical sulcus. Epistomial tooth prominent, smooth, triangular. Mandibular palp two-segmented; terminal segment single, undivided, with setae (but no hard flap) at junction between segments. Adult male abdomen slim, triangular, segments a1–a6 of male abdomen four-sided, telson (a7) a broad triangle with rounded apex; segments a5–a6 broadest. Dactylus of major cheliped broad, slightly arched, with large teeth, enclosing long thin interspace when fingers closed (Fig. 1C–F); first carpal tooth on carpus of cheliped large, pointed; second carpal tooth small, pointed, followed by several small granules; ventral margins of merus of pereopod 1 granulated; distal meral tooth distinct, pointed; superior surface of merus smooth. Pereiopods p2–p5 slender, length normal, neither elongated or shortened, p3 longest, p5 shortest, dactyli of p2–p5 tapering to point, each bearing four rows of downward-pointing short, sharp spines. Terminal article of gonopod 1 long, angled outward at 45° angle to longitudinal axis of gonopod (Fig. 2C, D); broadened in midsection (medial fold slightly higher than lateral fold); distal margin of subterminal segment indented in middle, highest on medial side lowest on lateral side; dorsal membrane very broad, widest medially, narrowest laterally; basal margins of subterminal segment of gonopod 1 with long setae.

Size.—A small species, the largest known specimen is the male holotype, cw 28 mm. Adults as judged by size at pubertal molt beginning around cw 16.5 mm and above (Dobson et al. 2007).

Live coloration.—Carapace uniformly brown, chelipeds and walking legs light brown, sternum and undersides of pereiopods p1–p5 pale brown-yellow.

Distribution.—*Potamonautes subukia* is known from the forested highlands of western Kenya including Subukia, Kakamega, and the Cherangani Mountains.

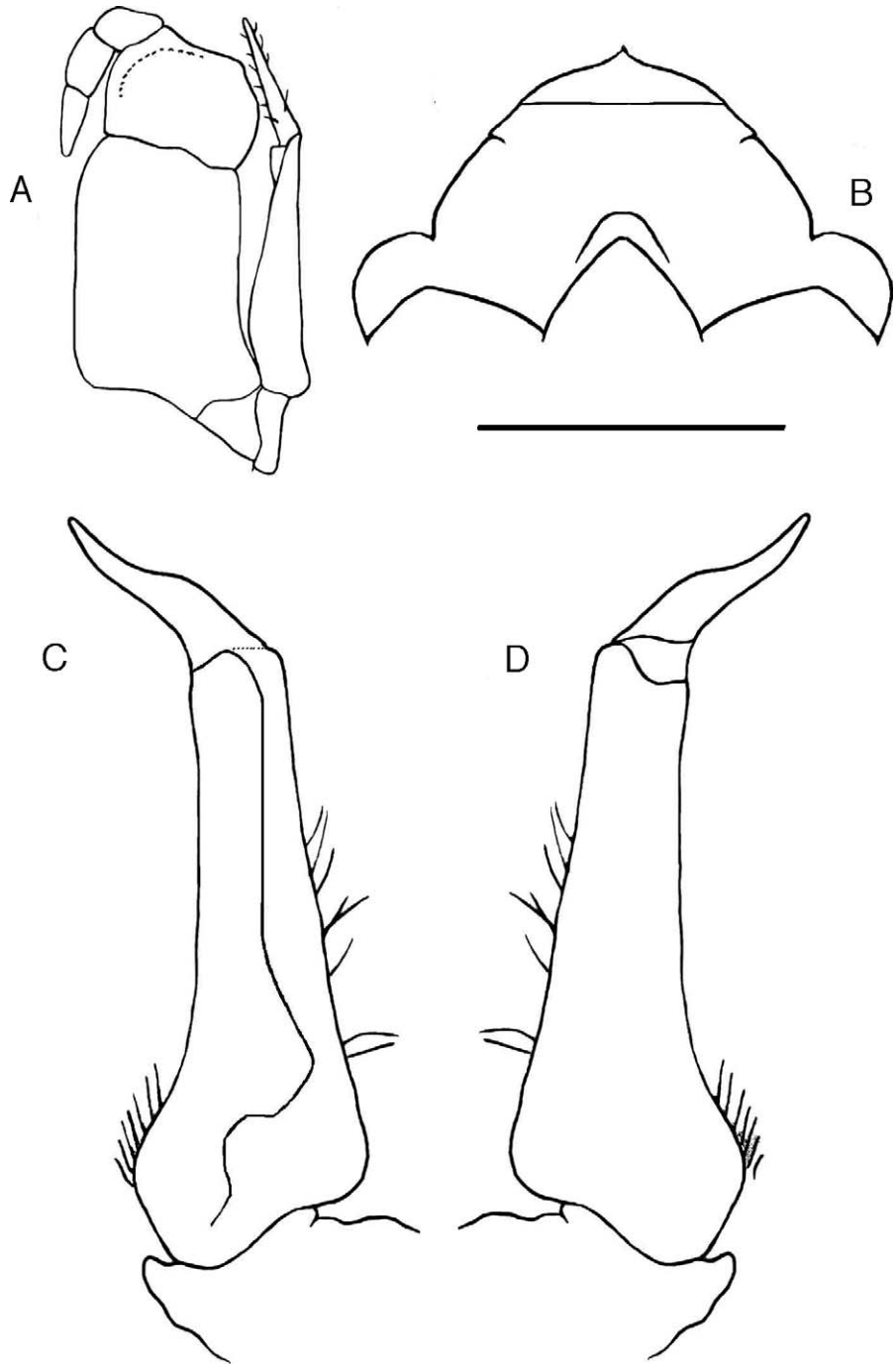

Fig. 2. *Potamonautes subukia*. Male holotype, cw 22.5 mm, from the Subukia, western Kenya, NMU 18.X.2003. A, left third maxilliped; B, sternum; C, left first gonopod ventral view; D, left first gonopod dorsal view. Scale bar = 4.6 mm (A, B), 2.0 (C, D).

Type locality.—Chinga River near Subukia (0°0′15.8″ N, 36°15′33.1″ E), Central Province, Kenya.

Remarks.—*Potamonautes subukia* is closest to *P. loveni* (Colosi, 1924), a medium-sized species of freshwater crab that is also found in this part of western Kenya and eastern Uganda (Williams 1991, Cumberlidge 1997, 1998). Unfortunately, the male type of *Potamon* (*Geothelphusa*) *loveni* (SMNH 1291) from Mt Elgon, Uganda is a subadult specimen (cw 26.3 mm) whose gonopods and chelipeds had yet to attain the adult form. The carapace features of *P. subukia* were compared with those of the sub-adult type of *P. loveni*. However, in order to compare an adult male of *P. subukia* with an adult male of *P. loveni* it was necessary to examine the holotype (cw 42.6 mm) of *P.* (*P.*) *harvardi* Rathbun, 1935 (MCZ 8241), also from Mt Elgon, which is a junior synonym of *P.* (*G.*) *loveni* (Williams 1991, Cumberlidge 1997, 1998). This specimen of *P.* (*P.*) *harvardi* is an adult whose gonopods and chelipeds have reached their final form.

Potamonautes subukia and *P. loveni* are similar in that both species have a completely smooth carapace with a faint, almost absent postfrontal crest, both have exorbital and epibranchial teeth that are reduced to small granules, and the anterolateral margins of the carapace of both species are completely smooth, lacking teeth of any kind. However, there are a number of other characters that distinguish these two taxa. For example, the terminal article of gonopod 1 of *P. subukia* is angled outward at a 45° angle to the longitudinal axis of the gonopod, whereas the terminal article of gonopod 1 of *P. loveni* is straight and is not significantly angled outward; the first carpal tooth on the carpus of the cheliped of *P. subukia* is large and pointed, whereas this tooth is smooth and low in *P. loveni*; the distal meral tooth on the merus of the cheliped of *P. subukia* is distinct and pointed, whereas this tooth is low and obscure in *P. loveni*; the dactylus of the cheliped of *P. subukia* has large teeth and forms a low arch that encloses a long thin interspace when the fingers are closed, whereas the dactylus of the cheliped of *P. loveni* is slim, lacks teeth, and forms a dramatic high arch that encloses a round interspace when the fingers are closed. Finally, *P. loveni* (whose adult size range is from cw 35 to 45 mm) is a much larger species than *P. subukia*: the latter species is adult at cw 16.5 mm, whereas a specimen of *P. loveni* of the same size would only be a subadult.

Ecology.—This species lives in streams draining the forested highlands of western Kenya and is sympatric with *P. loveni*. The life history and ecology of *P. subukia* has been studied in some detail at the type locality (Dobson et al. 2007), where it is the only crab species present. Here *P. subukia* is common with a population density that apparently exceeds 20 m^{-2}, with year round breeding and no seasonal variation in abundance. The pubertal molt of this species was estimated based on the examination of 37 adult females that were either carrying eggs or brooding young, of which the smallest had a carapace width of 16.5 mm.

Etymology.—The new species has been named for the type locality of Subukia, Kenya.

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